

# **EXHIBIT 109**

## ASBESTOS AND CAUSATION OF NON-RESPIRATORY CANCERS: EVALUATION BY THE INSTITUTE OF MEDICINE

*Jonathan M. Samet, M.D., M.S.\**

### INTRODUCTION

Asbestos refers to several mineral species when they occur in a fibrous form.<sup>1</sup> The asbestos fibers have useful properties of weavability, flexibility, and chemical and physical durability.<sup>2</sup> Consequently, asbestos has been widely used in building materials, friction products, and fire-retarding fabrics.<sup>3</sup> Asbestos consumption rose across the 20<sup>th</sup> century, peaking in the 1970s and then falling in response to a recognition of asbestos-related health risks, which ultimately led to bans of asbestos and substitution with other materials.<sup>4</sup>

Many of the millions of workers in the United States and other countries who have been exposed to asbestos have developed asbestos-caused diseases, and millions of current and

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\* M.D., M.S., Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland.

<sup>1</sup> THE AMERICAN HERITAGE DICTIONARY OF THE ENGLISH LANGUAGE 103 (4th ed. 2000).

<sup>2</sup> See James L. Stengel, *The Asbestos End-Game*, 62 N.Y.U. ANN. SURV. AM. L. 223, 226 (2006).

<sup>3</sup> See generally RACHEL MAINES, ASBESTOS AND FIRE: TECHNOLOGICAL TRADE-OFFS AND THE BODY AT RISK. (2005).

<sup>4</sup> Margaret R. Becklake, *Asbestos-Related Diseases of the Lung and Other Organs: Their Epidemiology and Implications for Clinical Practice*, 114 AM. REV. RESPIR. DIS. 187-227 (1976).

can be classified and on the availability of information on other factors, e.g., cigarette smoking, that may also cause the cancer and possibly modify the risk of asbestos exposure. In its assessment of the evidence, the committee carefully considered these methodological issues.

With regard to exposure classification, the cohort studies generally involved observation of asbestos worker groups and comparison of the incidence or mortality rates for the cancer of interest to rates in a comparison population—for many studies, the rates in the population in general. Employment in the asbestos industry is a surrogate for exposure, on the tenable assumption that workers in an industry involved with asbestos would have more exposure on average than the general population or a similar worker group in an industry not involved with asbestos. Some of the cohort studies also included semi-quantitative estimates of the exposures of the workers to asbestos fibers; generally, these estimates are based on a limited set of measurements of the concentrations of airborne fibers in workplaces, extrapolation of the measurements, and expert judgment of industrial hygienists. These estimates potentially have a high degree of error, but are useful for exploring dose-response relationship. Because the error is generally random, it tends to flatten dose-response relationships, making them more difficult to detect.

In the case-control studies, a variety of interview-based approaches have been used to classify exposure to asbestos. Generally, the study protocols include taking a full occupational history, covering each job and industry of employment. This work history information is then matched against a job-exposure matrix that gives the likelihood of being exposed for a particular job.<sup>36</sup> In the case-control studies considered by the committee,

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<sup>36</sup> P.A. Stewart & W.F. Stewart, *Occupational Case-Control Studies: II. Recommendations for Exposure Assessment*, 23 AM. J. IND. MED. 313, 313-26 (1994). See also, P.A. Stewart et al., *A Novel Approach to Data Collection in a Case-control Study of Cancer and Occupational Exposures*, 25 INT'L. J. EPIDEMIOLOGY 744 (1996); P.A. Stewart et al., *Questionnaires for Collecting Detailed Occupational Information for Community-based Case-control Studies*, 59 AM. IND. HYG. ASSOC. J. 39 (1998).